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(21) International Application Number: PCT/IB99/00268 (22) International Filing Date: 15 February 1999 (15.02.99) (30) Priority Data: 1819601/AM 13 February 1998 (13.02.98) GB (71) Applicant: TATIS LIMITED [GB/GB]; Harston Mill, Harston, Cambridge CB2 5NH (GB). (71)(72) Applicant and Inventor: DURAND, Julian [IT/CA]; 31 Lockhart, Saint Pierre de Wakefield, Quebec J8N 2R9 (CA). (72) Inventor: VEYRASSAT, Marc–Henri; Grand Rue, 50, CH–1180 Rolle (CH). (74) Common Representative: TATIS LIMITED; 18 bis, Avenue Juste–Olivier, CH–1006 Lausanne (CH).	(81) Designated States: European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). **Published** *With international search report.* *Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.*

(54) Title: TRADE INFORMATION SYSTEM

(57) Abstract

Trade Information System (TIS) is a trade data management system whose central objective is to streamline and automate the customs clearance and reconciliation procedures of customs and fiscal authorities in developing and emerging countries. TIS(tm) has been designed to replace a service known as preshipment inspection currently used in over thirty countries throughout the developing world. TIS is a networked process that allows governments, customs and tax authorities, and other participants in the global trade arena to easily access, exchange, and reconcile vital trade–related information. TIS enables information such as the names of the trade players, the quantity, description and value of goods, and other critical information to be captured at the export stage, validated, and disseminated simultaneously in two different directions: electronically to government officials in the country of import and as a secure machine–readable document (2D bar code) that travels with the shipment. Information is not only transmitted to the Fiscal Authorities in the country of import by the network. In addition, the trade related information is digitally signed and encoded on a 2 dimensional symbol (PDF417) that can be read by a scanner. When the shipment arrives at the port of entry, the customs officer need only scan the bar code with a portable scanner to gain instant access to the validated information required for customs clearance.

Trade Information System

Description

Trade Information Systems (TIS) is a system that allows participants such as exporters, importers, shipping agents, banks and governments to share information more securely and easily. TIS integrates both electronic information from networks with a machine-readable stamp (the 'TISymbol') that carries the pertinent information from shipping documents (see section 2.3.5).

The TISymbol is a unique integration of a PDF417 2D bar code (so that paper documentation is machine readable) together with a digital signature (to ensure that authenticity of issuer may be identified and to guarantee that information has not been modified).

In the sections that follow, we describe the applications and environment I which the TISymbol will be used; the TISymbol is used as a digitally signed and certified authorization for the exporter to ship its goods and is described in section 2.2; finally the data elements that are present in each of the databases is described and, more specifically, the data that makes up the TISymbol.

Applications

There are five applications (for the Importer, VA, VB, Point of Entry, Fiscal Authorities and the Exporter) that will be used in the prototype. The attached Drawings document shows this in Figure 1.

In addition to these five applications which manage the on-going TIS process, there is a registration procedure for importers where details of the corporation are submitted to the VA for approval and issuing of public/private key pair. In this process. the importer identifies their principal business partners (the 'exporters') abroad that will be registered as well. In the prototype we will not provide certification of these key pairs since it can be assumed that issuance of the key pair by the VA will serve as a de facto certification. In the production version, we will almost surely use certified keys.

All applications share core functions of testing (communications, signing with digital signature); login to the application using private key: tracking of transactions through the TIS system.

TIS/Importer RTA (Request Transit Authorization)

The importer application requests authorization for a transaction by submitting transaction details on-line to the VA. The process is as follows:

1) login with profile;

2) transmit transaction details (see Appendix 1 the Transaction Rec rd);

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The VA receives RTA and considers results from RAS. If further intervention is required the VA sends instruction to VB.

3) if authorization is issued by the VA, the importer is notified and is then able to track status of shipment;

TIS/VA (TIServer)

The validation authority makes use of the TIServer and the RAS to authorize transactions, issue an instruction to a Validation Body and issue a TISymbol. The authorization control flow with relevant states is depicted in the section below.

Procedure as follows:

1) login with profile;

2) receive RTA from importer;

3) perform risk analysis on participants and transaction;

4) issue instruction to VB as required;

5) authorize (or not) transaction and issue TISymbol;

6) transmit transaction record to FA.

TIS/Exporter

The exporter application is straightforward providing the capability to:

1) receive an encrypted TISymbol;

2) decrypt the TISymbol;

3) print the TISymbol;

4) track the consignment.

TIS/FA Fiscal Authorities (FA application)

The TIS/FA is the application used by the client government. With the TIS/FA users will have the following capabilities:

1) receive new transaction records;

2) authorize a transaction;

3) set risk indicators and their relative weight in the RAS;

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4) perform risk analysis on incoming transactions:

5) send schedule of incoming transactions to the POEs with inspection instructions;

6) reconcile transaction record when goods have been received at the POE and set status of transaction record to 'closed';

7) send status of all transaction records to TIS/VA with inspection results.

TIS/ POE Point of Entry

The customs officers use the point of entry application. It allows the POE to:

1) Receive pending shipments list from TIS/FA with instructions;

2) read and verify the TISymbol;

3) perform reconciliation of the transaction record with the TIS/FA;

4) in case there was an inspection the results should be recorded and later transmitted to TIS/FA.

Authorization Flow Chart

The authorization chart is depicted in Figure 2 in the attached drawings document. In order for a TIS transaction to be approved and the TISymbol issued, it is necessary for the Importer to send a Request for Transaction Authorization. The RTA is the trigger for the process. Note that in some cases it will be possible for the exporter to also trigger the process by sending an RTA.

The RTA is sent to the Validation Authority. Experts at the VA will be presented with incoming RTA and the result of the Risk Analysis System recommending action of some sort. If the RAS indicates error levels are acceptable, then the status of the transaction becomes 'OK' and the TISymbol is sent to the Exporter. The Exporter shall have the opportunity to refuse the transaction if there are errors.

Should the RAS indicate abnormalities in the transaction information then the VA sends an instruction to the relevant Validation Body. The status of the transaction becomes VB_WAIT.

Should the report of the VB indicate that the transaction is all right, the status is set back to OK and the TISymbol issued. Otherwise, if the VB reports that there are continuing irregularities, then the matter is presented to the Fiscal Authorities who have the last word.

If the FA refuses the shipment then the procedure is complete and the transaction cancelled. The status is set to NO. Otherwise the status is set to OK and the TISymbol is issued.

These details can be seen in the figure and table below.

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Status	Meaning
OK	Authorization given (either by VA immediately or as a result of VB report or FA intervention). TISymbol is issued.
WAIT_VB	The RAS indicates an unacceptable level of risk. The VA instructs the VB to investigate further. Status is waiting for VB report.
WAIT_FA	The VB report indicates there is too high risk or some other irregularity. The RTA is forwarded to the FA for final decision.
NO	The FA refuses RTA.
C(LOSED)	The goods arrive at the port of entry and the transaction record is closed.

Data Elements

The simplified entity-relationship diagram is depicted in Figure 3 in the attached drawings document.

Transaction Record

There are two tables that are used for each transaction. These are called TRANSACTION which hold the details for a particular transaction and TRANSACTION_PM which holds details of the packages and their marks.

The TRANSACTION table is detailed in the figure below with its data elements and type.

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	Field Name	Description	Risk?
Transaction_ID	Transaction_ID	Unique id to identify each transaction	No
POE	POE	Planned port-of-entry linked to Port of Entry lookup table	Yes
ExporterID	ExporterID	Exporter, linked to the EXPORTER table	Yes
ImporterID	ImporterID	Importer, linked to IMPORTER table	Yes
Qtypckges	Qtypckges	Number of Packages	No
Regdate	Regdate	Date of registration of transaction request	Yes
Shipdate	Shipdate	Planned ship date	Yes
ETA	ETA	Expected Date of Arrival	Yes
LOC_ID	LOC_ID	Letter of Credit ID	No
LOC_Expiry	LOC_Expiry	Letter of Credit Expiry	Yes
Status	Status	Status of transaction (details in flow control section below)	No
Mark	Mark	Descriptive packaging marks for entire consignment	No
Mode	Mode	Mode of transportation	Yes
POOCity	POOCity	Port of Origin City	Yes
POOCountry	POOCountry	Port of Origin Country	Yes
Vessel	Vessel	Identification of vessel (name, license no etc)	Yes
SA_ID	SA_ID	Shipping agent ID	Yes
ContainerNo	ContainerNo	Container number	No
SealNo	SealNo	Seal number	No
InvoiceNo	InvoiceNo	Invoice Number	No
InvoiceDate	InvoiceDate	Invoice Date	Yes
OrderNo	OrderNo	Order No	No
PO_No	PO_No	Purchase Order number	No
TotalInvoice	TotalInvoice	Total Amount of Invoice	Yes
InvoiceCurr	InvoiceCurr	Invoice Currency	Yes
Results	Results	Result from POE	No

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Transaction details for each package

TRANSACTION_PM	Field Name	Description	Risk?
TPM_ID LONG (AK) transaction_ID LONG (FK) (IE) PM_ID LONG (FK) (IE) HSC_ID LONG (FK) (IE) COG TEXT(2) ProdNo LONG ProdName TEXT(50) Qty LONG UnitPrice LONG	TPM_ID	ID number for each package in shipment	No
	transaction_ID	ID of transaction this P&M belongs to	No
	PM_ID	Packaging & Marks code	No
	HSC_ID	HS code	Yes
	COG	Country of Origin of goods	Yes
	ProdNo	Product Number	Yes
	ProdName	Product Name	Yes
	Qty	Quantity	Yes
	UnitPrice	Unit Price	Yes

Importer Table

IMPORTER	Field Name	Description	Risk?
IMPORTER_ID LONG Name TEXT(30) (IE) Address TEXT(50) (IE) City TEXT(30) (IE) ZIP TEXT(10) Country TEXT(2) (IE) Contact TEXT(50) (IE) Phone TEXT(20) Fax TEXT(20) Email TEXT(30) (IE) Pkey OBJECT PrivKey OBJECT Regdate DATE (IE) License TEXT(20) LicenseExpiry DATE	IMPORTER_ID	Unique ID	No
	Name	Company name	Yes
	Address	Address	No
	City	City	Yes
	ZIP	Zip or postal code	No
	Country	Country	Yes
	Contact	Contact person	Yes
	Phone	Telephone number	No
	Fax	Fax number	No
	Email	Email address	No
	Pkey	Public key	No
	PrivKey	Private key	No

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	Regdate	Registration date	Yes
	License	Import license number	Yes
	LicenseExpiry	Expiry date of import license	Yes

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Exporter Table

EXPORTER
EXPORTER_ID LONG Name TEXT(30) (IE) Address TEXT(50) (IE) City TEXT(30) (IE) ZIP TEXT(10) Country TEXT(2) (IE) Contact TEXT(30) (IE) Phone TEXT(20) Fax TEXT(20) Email TEXT(30) (IE) Pkey OBJECT Privkey OBJECT Regdate DATE (IE)

Field Name	Description	Risk?
EXPORTER_ID	Unique ID	No
Name	Company name	Yes
Address	Address	No
City	City	Yes
ZIP	Zip or postal code	Yes
Country	Country	Yes
Contact	Contact person	Yes
Phone	Telephone number	No
Fax	Fax number	No
Email	Email address	No
Pkey	Public key	No
Privkey	Private key	No
Regdate	Registration date	Yes

TISymbol

Table Name	Field[1]
TRANSACTION	transaction_ID,
IMPORTER	IMPORTER_ID
IMPORTER	Name
IMPORTER	Address
IMPORTER	City
IMPORTER	ZIP
IMPORTER	Country (lookup)
IMPORTER	License

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[1] see previous table descriptions for meaning of field names

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IMPORTER	LicenseExpiry
TRANSACTION	LOC_ID
TRANSACTION	LOC_Expiry
TRANSACTION	InvoiceNo
TRANSACTION	InvoiceDate
TRANSACTION	TotalInvoice
_CURRENCY	CurrencySymbol (lookup)
TRANSACTION	ContainerNo
TRANSACTION	SealNo
TRANSACTION	P_number
FirstPackage	ProdNo
FirstPackage	ProdName
FirstPackage	_PM.Name (lookup)
FirstPackage	HSC_ID
FirstPackage	_HSC.Name (lookup)
LastPackage	ProdNo
LastPackage	ProdName
LastPackage	PMName
LastPackage	HSC_ID
LastPackage	HSCName
EXPORTER	EXPORTER_ID
EXPORTER	Name
EXPORTER	Address
EXPORTER	City
EXPORTER	ZIP
EXPORTER	Country (lookup)
_POE	POE_ID

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_POE	POE_Name
_POE	Country (lookup)
TRANSACTION	Shipdate
TRANSACTION	ETA
TRANSACTION	PM_ID
TRANSACTION	POOCity
TRANSACTION	POOCountry (lookup)
TRANSACTION	Vessel
TRANSACTION	SA_ID
_SA	SA_Name
TRANSACTION	OrderNo
TRANSACTION	PO_No

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Claim

(1) The TISymbol is an integration of a 2 dimensional bar code (PDF417) with information secured with a certified digital signature. Prior art includes the 2D symbol (PDF417) and the means of digitally signing information. What does not, to date, exist is the integration of these technologies as it applies to international trade. There are a number of important issues that are involved with this integration the greatest constraints being data capacity and verification of the certified digital signature with a hand held device. The creation of the TISymbol successfully addresses these issues.

(2) The TISymbol Scanner is capable of reading the compressed TISymbol and verifying the certified digital signature.

Symbol technologies currently builds and sells scanners that can read 2D symbols (PDF417), however, the scanner cannot verify the certified digital signature without connecting to a computer for processing. TIS requires that the verification of a digital signature be carried out on a handset, therefore, we have designed a scanner that will have an on-board verification chip that will provide speedy hardware verification of the digital signature. The verification chip is available from ASCOM for the IDEA encryption / digital signature algorithm. We will be the first to incorporate both reading of data with the verification of the digital signature.
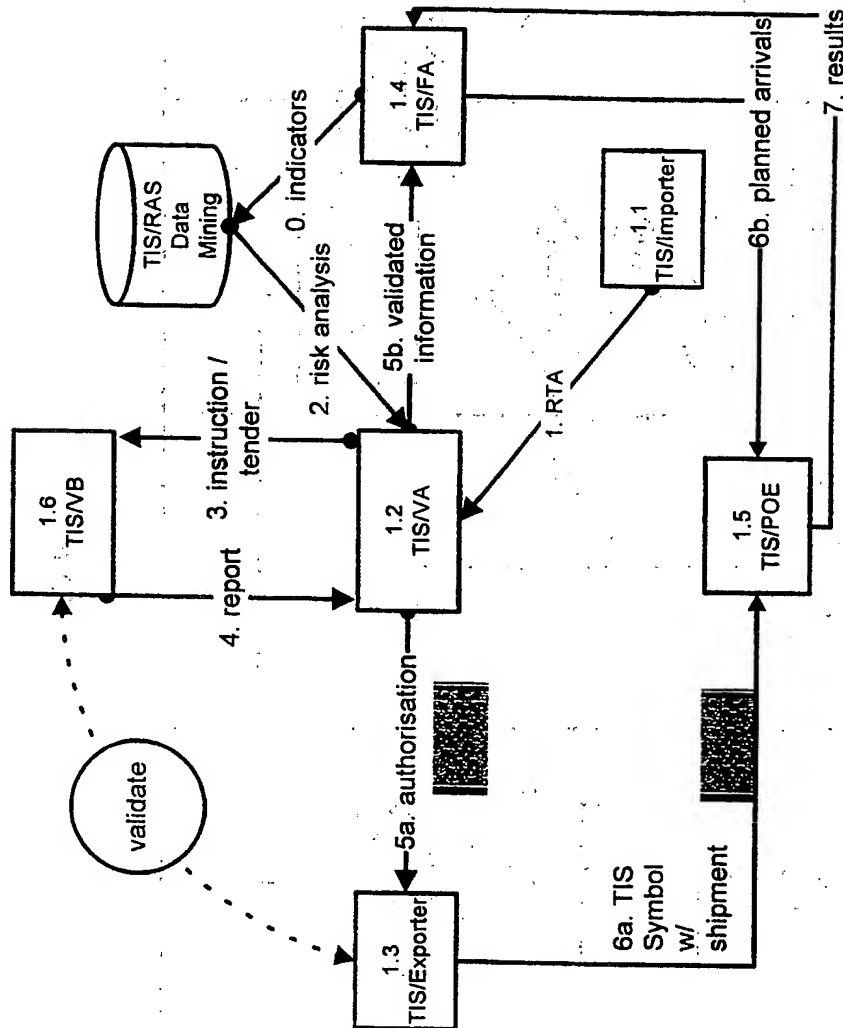
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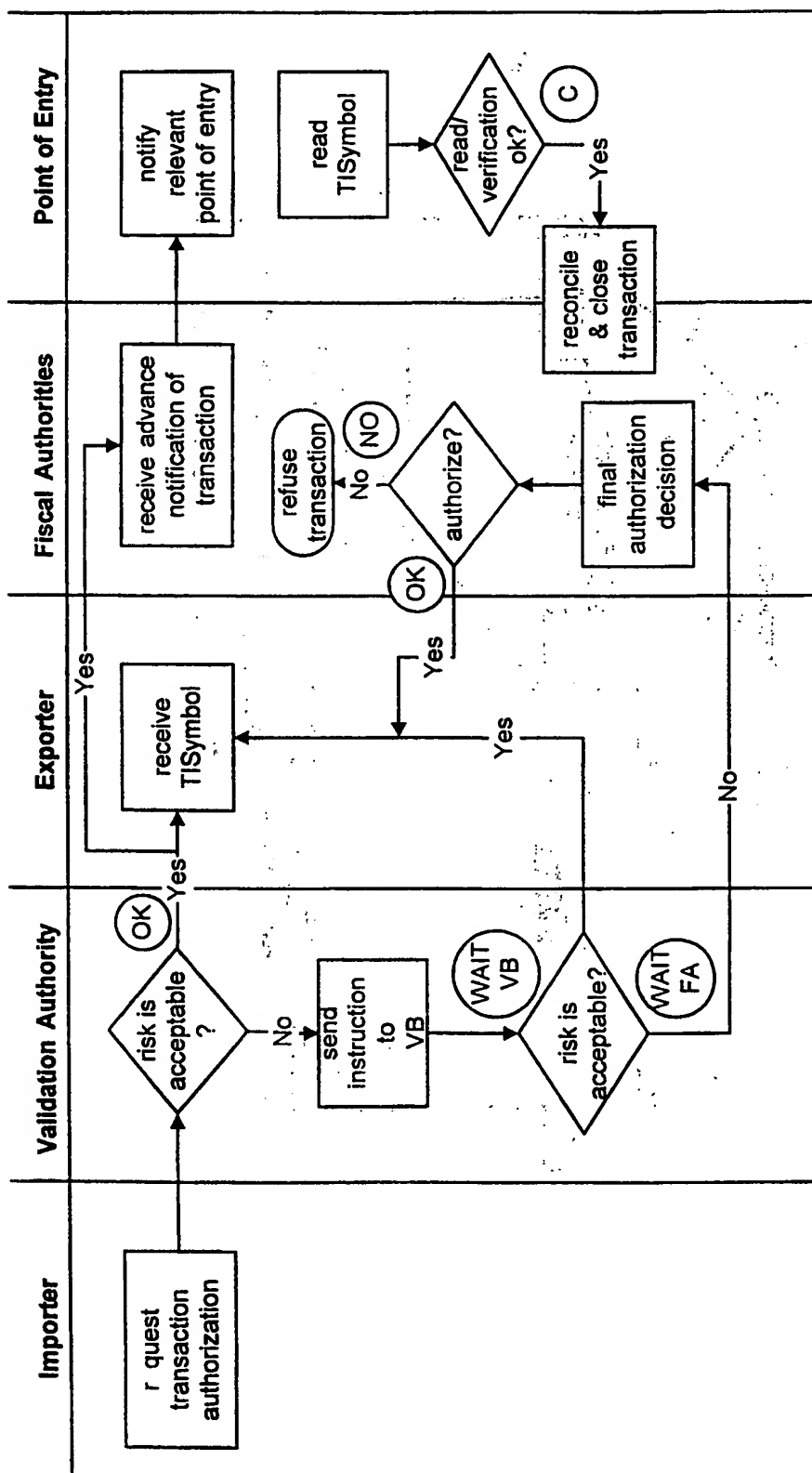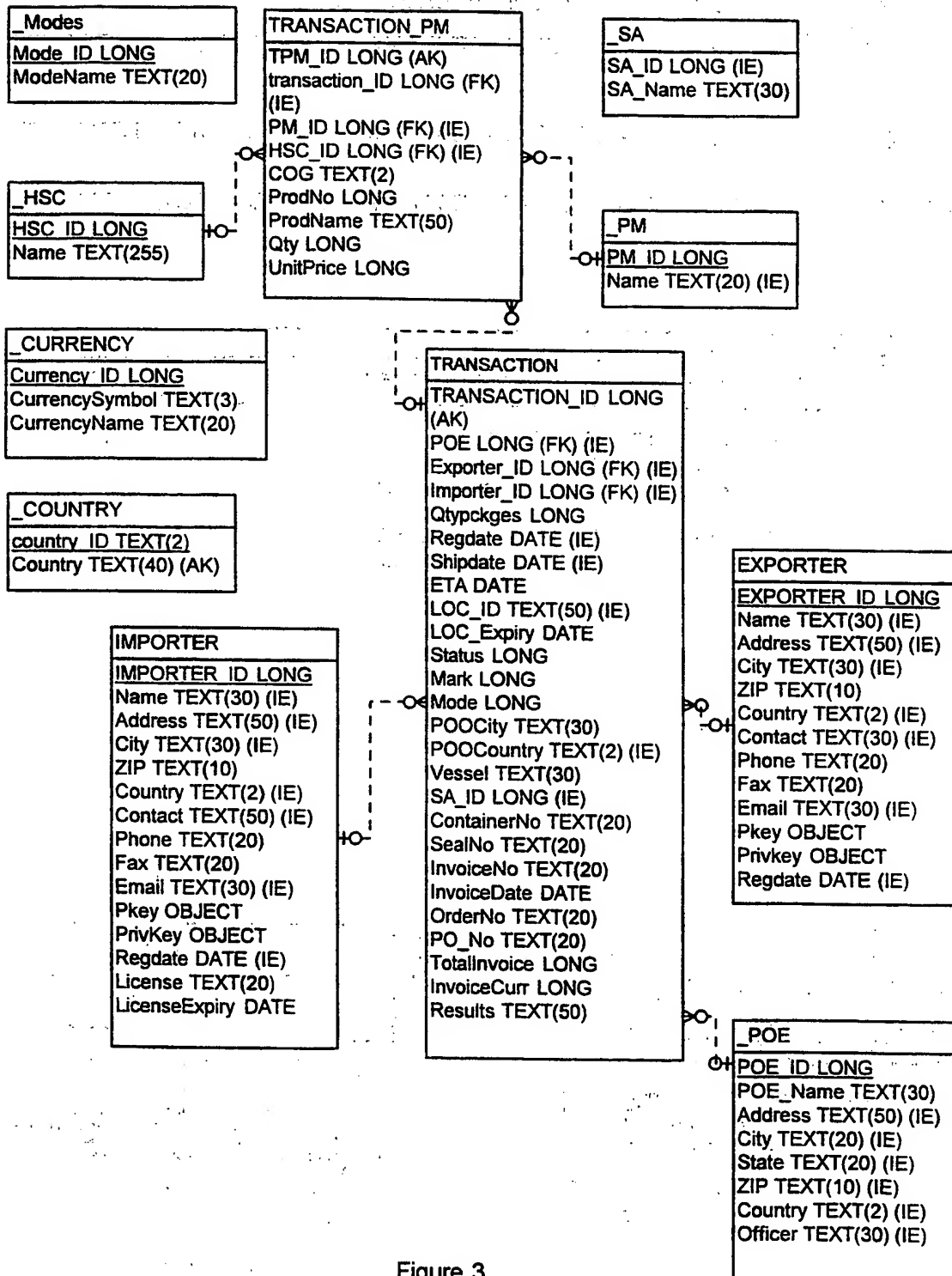
1/3

Figure 1

Figure 2

_Modes

Mode_ID LONG
ModeName TEXT(20)

TRANSACTION_PM

TPM_ID LONG (AK)
transaction_ID LONG (FK) (IE)
PM_ID LONG (FK) (IE)
HSC_ID LONG (FK) (IE)
COG TEXT(2)
ProdNo LONG
ProdName TEXT(50)
Qty LONG
UnitPrice LONG

_SA

SA_ID LONG (IE)
SA_Name TEXT(30)

_HSC

HSC_ID LONG
Name TEXT(255)

_PM

PM_ID LONG
Name TEXT(20) (IE)

_CURRENCY

Currency_ID LONG
CurrencySymbol TEXT(3)
CurrencyName TEXT(20)

TRANSACTION

TRANSACTION_ID LONG (AK)
POE LONG (FK) (IE)
Exporter_ID LONG (FK) (IE)
Importer_ID LONG (FK) (IE)
Qtypckges LONG
Regdate DATE (IE)
Shipdate DATE (IE)
ETA DATE
LOC_ID TEXT(50) (IE)
LOC_Expiry DATE
Status LONG
Mark LONG
Mode LONG
POOCity TEXT(30)
POOCountry TEXT(2) (IE)
Vessel TEXT(30)
SA_ID LONG (IE)
ContainerNo TEXT(20)
SealNo TEXT(20)
InvoiceNo TEXT(20)
InvoiceDate DATE
OrderNo TEXT(20)
PO_No TEXT(20)
TotalInvoice LONG
InvoiceCurr LONG
Results TEXT(50)

_COUNTRY

country_ID TEXT(2)
Country TEXT(40) (AK)

EXPORTER

EXPORTER_ID LONG
Name TEXT(30) (IE)
Address TEXT(50) (IE)
City TEXT(30) (IE)
ZIP TEXT(10)
Country TEXT(2) (IE)
Contact TEXT(30) (IE)
Phone TEXT(20)
Fax TEXT(20)
Email TEXT(30) (IE)
Pkey OBJECT
Privkey OBJECT
Regdate DATE (IE)

IMPORTER

IMPORTER_ID LONG
Name TEXT(30) (IE)
Address TEXT(50) (IE)
City TEXT(30) (IE)
ZIP TEXT(10)
Country TEXT(2) (IE)
Contact TEXT(50) (IE)
Phone TEXT(20)
Fax TEXT(20)
Email TEXT(30) (IE)
Pkey OBJECT
PrivKey OBJECT
Regdate DATE (IE)
License TEXT(20)
LicenseExpiry DATE

_POE

POE_ID LONG
POE_Name TEXT(30)
Address TEXT(50) (IE)
City TEXT(20) (IE)
State TEXT(20) (IE)
ZIP TEXT(10) (IE)
Country TEXT(2) (IE)
Officer TEXT(30) (IE)

Figure 3

INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 G06K19/06   G06F7/10

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 G06K G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 598 477 A (BERSON WILLIAM) 28 January 1997 see column 3, line 52 - column 4, line 9	1,2
A	EP 0 600 646 A (PITNEY BOWES) 8 June 1994 see column 3, line 19 - column 5, line 24; figure 2	1,2

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
2 July 1999	21 07 1999

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Chiarizia, S

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Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB 99/00268

Box I   Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
   because they relate to subject matter not required to be searched by this Authority, namely:

2. ☒ Claims Nos.:   1 partly and 2 partly
   because they relate to parts of the International Application that do not comply with the prescribed requirements to such
   an extent that no meaningful International Search can be carried out, specifically:

   The wording of the two independent claims is such that it does not allow to
   perform a search that could be considered as being complete. An incomplete
   search has been performed on a combination of a 2 dimensional bar code with
   secured information, like digital signature.

3. ☐ Claims Nos.:
   because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II   Observations where unity of Invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all
   searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment
   of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report
   covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is
   restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

Form PCT/ISA/210 (continuation of first sheet (1)) (July 1998)